

WHAT IS CLAIMED IS:

1. An apparatus for measuring a fluid level in a tank with a tank opening and a float guide member adapted to engage a tank opening, the apparatus comprising:

- 5           a) a housing including a level indicator adapted to display a measured fluid level;
- b) a float associated with the level indicator;
- c) an elongated flexible member having a first end and a second end, wherein the first end is attached to the float;
- 10          d) a spool adapted to store at least a portion of the elongated flexible member, the second end of the elongated flexible member being attached to the spool;
- e) a biasing member adapted to urge the spool to automatically uptake portions of the elongated flexible member as the float travels towards the housing and adapted to allow the elongated flexible member to unwind  
15           from the spool as the float travels away from the housing; and
- f) a mounting device attached to the housing and including an interior passageway, wherein a length of the elongated flexible member is adapted to extend through the interior passageway, and wherein the mounting  
20           device is adapted to attach to a tank opening after a separate float guide member is engaged with the tank opening.

2. The apparatus of claim 1, wherein the mounting device is adapted to trap a first end portion of a float guide member between a portion of the mounting device and a tank opening.

3. The apparatus of claim 2, wherein the portion of the mounting device includes an interior shoulder.

4. The apparatus of claim 2, wherein the mounting device includes a threaded portion and an interior shoulder, wherein the threaded portion is adapted to engage a tank opening and the interior shoulder is adapted to engage a first end portion of a float guide member.

5. The apparatus of claim 2, wherein the mounting device is adapted to simultaneously engage a first end portion of a float guide member and a tank opening while a first end portion of the float guide member engages a tank opening.

6. The apparatus of claim 1, wherein the mounting device is rotatably attached to the housing.

7. The apparatus of claim 1, wherein the mounting device includes a first end, a second end, a threaded portion disposed adjacent the second end of the mounting device, and an interior shoulder disposed between the threaded portion and the first end of the mounting device, wherein the mounting device is rotatably attached to the housing.

8. The apparatus of claim 1, wherein the level indicator includes a first level indicating gear, a second level indicating gear, and a first indexing device adapted to facilitate an incremental rotation of the second level indicating gear based on a rotation of the first level indicating gear, wherein the first indexing device is adapted to interact with  
5 a first corresponding level indicating gear comprising one of the first level indicating gear

and the second level indicating gear to substantially prevent movement of the first indexing device away from the first corresponding level indicating gear.

9. The apparatus of claim 8, wherein the first indexing device and the first corresponding level indicating gear define a tongue-and-groove structure adapted to substantially prevent movement of the first indexing device away from the first corresponding level indicating gear.

10. A tank assembly comprising:

- a) a tank with a tank opening and a tank interior in communication with the tank opening;
- b) a float guide member comprising a first end portion engaging the tank opening and a second end portion positioned within the tank interior; and
- c) an apparatus for measuring a fluid level comprising:
  - i) a housing including a level indicator adapted to display a measured fluid level;
  - ii) a float associated with the level indicator;
  - iii) an elongated flexible member having a first end and a second end, wherein the first end is attached to the float;
  - iv) a spool adapted to store at least a portion of the elongated flexible member, the second end of the elongated flexible member being attached to the spool;

- 15                    v)     a biasing member adapted to urge the spool to automatically uptake portions of the elongated flexible member as the float travels towards the housing and adapted to allow the elongated flexible member to unwind from the spool as the float travels away from the housing; and
- 20                    vi)    a mounting device attached to the housing and including an interior passageway, wherein a length of the elongated flexible member is adapted to extend through the interior passageway, and wherein the mounting device is attached to the tank opening.

11.     The tank assembly of claim 10, wherein the mounting device traps the first end portion of the float guide member between a portion of the mounting device and the tank opening.

12.     The tank assembly of claim 11, wherein the portion of the mounting device includes an interior shoulder.

13.     The tank assembly of claim 11, wherein the mounting device simultaneously engages the first end portion of the float guide member and the tank opening while the first end portion of the float guide member engages the tank opening.

14.     The tank assembly of claim 10, wherein the mounting device includes a threaded portion and an interior shoulder, wherein the threaded portion engages the tank opening and the interior shoulder engages the first end portion of the float guide member.

15.     The tank assembly of claim 10, wherein the mounting device includes a  
5 first end, a second end, a threaded portion disposed adjacent the second end of the mounting device, and an interior shoulder disposed between the threaded portion and the

first end of the mounting device, wherein the mounting device is rotatably attached to the housing.

16. The tank assembly of claim 10, wherein the level indicator includes a first  
10 level indicating gear, a second level indicating gear, and a first indexing device adapted to facilitate an incremental rotation of the second level indicating gear based on a rotation of the first level indicating gear, wherein the first indexing device is adapted to interact with a first corresponding level indicating gear comprising one of the first level indicating gear and the second level indicating gear to substantially prevent movement of  
15 the first indexing device away from the first corresponding level indicating gear.

17. The tank assembly of claim 16, wherein the first indexing device and the first corresponding level indicating gear define a tongue-and-groove structure adapted to substantially prevent movement of the first corresponding indexing device away from the first corresponding level indicating gear.

18. The tank assembly of claim 10, wherein the float guide member comprises an elongated tube.

19. The tank assembly of claim 10; wherein the mounting device is rotatably attached to the housing.

20. An apparatus for measuring a fluid level in a tank comprising:  
  
a) a housing including a level indicator adapted to display a measured fluid level, the level indicator including a first level indicating gear, a second level indicating gear, and a first indexing device adapted to facilitate an  
5 incremental rotation of the second level indicating gear based on a rotation of the first level indicating gear, wherein the first indexing device is

adapted to interact with a first corresponding level indicating gear comprising one of the first level indicating gear and the second level indicating gear to substantially prevent movement of the first indexing device away from the first corresponding level indicating gear;

- 5           b)     a float associated with the level indicator;
- c)     an elongated flexible member having a first end and a second end, wherein the first end is attached to the float;
- d)     a spool adapted to store at least a portion of the elongated flexible member, and the second end of the elongated flexible member being
- 10           attached to the spool; and
- e)     a biasing member adapted to urge the spool to automatically uptake portions of the elongated flexible member as the float travels towards the housing and adapted to allow the elongated flexible member to unwind from the spool as the float travels away from the housing.

21.     The apparatus of claim 20, wherein the first indexing device and the first corresponding level indicating gear define a tongue-and-groove structure adapted to substantially prevent movement of the first indexing device away from the first corresponding level indicating gear.

22.     The apparatus of claim 21, wherein the first indexing device is provided with a groove and the first corresponding level indicating gear comprises a tongue, wherein a portion of the tongue extends into a portion of the groove.

23. The apparatus of claim 21, wherein the first indexing device comprises an indexing gear and an alignment device, wherein the groove is defined between a portion of the indexing gear and a portion of the alignment device.

24. The apparatus of claim 23, wherein the indexing gear and the alignment device are mounted with respect to the housing for relative rotation with respect to one another.

25. The apparatus of claim 20, wherein the first corresponding level indicating gear comprises the first level indicating gear.

26. The apparatus of claim 20, wherein the level indicator further comprises a third level indicating gear and a second indexing device adapted to facilitate an incremental rotation of the third level indicating gear based on a rotation of the second level indicating gear, wherein the second indexing device is adapted to interact with a  
5 second corresponding level indicating gear comprising one of the second level indicating gear and the third level indicating gear to substantially prevent movement of the second indexing device away from the second corresponding level indicating gear.

27. The apparatus of claim 26, wherein the first corresponding level indicating gear comprises the first level indicating gear.

28. The apparatus of claim 27, wherein the second corresponding level indicating gear comprises the second level indicating gear.

29. A method of installing an apparatus for measuring a fluid level and a float guide member to a tank, the tank including a tank interior and a tank opening in communication with the tank interior, the float guide member including a first end portion and a second end portion, and the apparatus including: i) a housing with a level

5 indicator adapted to display a measured fluid level, ii) a float associated with the level indicator, iii) an elongated flexible member having a first end and a second end, wherein the first end is attached to the float, iv) a spool adapted to store at least a portion of the elongated flexible member, the second end of the elongated flexible member being attached to the spool, v) a biasing member adapted to urge the spool to automatically  
10 uptake portions of the elongated flexible member as the float travels towards the housing and adapted to allow the elongated flexible member to unwind from the spool as the float travels away from the housing, and vi) a mounting device attached to the housing and including an interior passageway, wherein a length of the elongated flexible member is adapted to extend through the interior passageway, wherein the method comprises the  
15 steps of:

- a) inserting the second end portion of the float guide member through the tank opening and into the tank interior until the first end portion of the float guide member engages the tank opening;
- b) associating the float with the float guide member; and
- 20 c) attaching the mounting device of the apparatus to the tank opening after the first end portion of the float guide member is engaged with the tank opening.

30. The method of claim 29, wherein the mounting device traps the first end portion of the float guide member between a portion of the mounting device and the tank opening.

31. The method of claim 30, wherein the portion of the mounting device includes an interior shoulder.



32. The method of claim 30, wherein the step of attaching the apparatus to the tank includes positioning the mounting device such that it simultaneously engages the first end portion of the float guide member and the tank opening while the first end portion of the float guide member engages the tank opening.

5           33. The method of claim 29, wherein the mounting device includes a threaded portion and an interior shoulder, and wherein the step of attaching the apparatus to the tank includes threading the mounting device to the tank opening such that the interior shoulder of the mounting device traps the first end portion of the float guide member between the portion of the mounting device and the tank opening.

34. The method of claim 29, further comprising the step of calibrating the apparatus.

35. The method of claim 29, further comprising the step of modifying the float guide member prior to the step of inserting the portion of the float guide member through the tank opening.

36. The method of claim 35, wherein the step of modifying the float guide member comprises shortening a length of the float guide member.

37. The method of claim 29, wherein the float guide member comprises an elongated tube with an interior passage and wherein the step of associating the float with the float guide member comprises the step of inserting the float into the interior passage of the tube.